

STUDY OF WORKER'S EARNINGS AND EDUCATION

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C H A P T E R I

I N T R O D U C T I O N

India is faced with the dilemma of educated unemployed and shortage of skilled and trained manpower to handle modern sophisticated technology. This among other things calls for determining the economic rationale and effectiveness of various levels of education in the country. The question of workers education is assuming increasing importance day after day in the present Indian context. Though still a predominantly agricultural country, India is aspiring to become a modern industrialised nation in short span of time and catch up with the most developed economies of the world. It is universally recognised that key to modernisation is rapid industrialisation because that alone can be depended upon to end the appalling poverty of the people; remove social backwardness and stir the frustrated masses to purposeful activity. The precondition to achieve these objectives is a properly planned system of workers education so that they can become the conscious participants in the task of national development.

The fifteen years of planned development are marked by the following characteristics:

1. A fairly extensive net work of heavy and basic industries which was almost non-existent before independence.

2. Emergence of a sizable number of scientists and technicians who are distinguished for their talent and competence. It means that a high level manpower potential

is already there.

3. Large quantitative expansions in the field of education.

But we have not been able to inter-relate these scattered positive elements and gear them to the difficult and complex task of rapid economic and social development. The pre-requisites of an effective educational policy are the following:

1. Linking education to manpower requirements of the economy.

2. Establishing the investment criteria of education and not treating it just a residual sector into which resources may flow when surplus and may be withdrawn when scarce.*

3. Evolving of a National Policy of Education** which is in keeping with our own national needs and resources and is not a poor copy of what prevails in other countries.

Benefit-cost analysis of various levels of education will help clarify the investment criteria of that level and thus enable the educational planner to take a rational decision on economic grounds. The present project is an exercise in this direction. It is an attempt to study

*E.A.G. Robinson in his introduction to Economics of Education (Macmillan & Co., New York, 1966), co-edited by John Vaisey says "Any country would be gravely mistaken if it regarded education as primarily a consumption; as a desirable form of welfare expenditure permissible to a rich country and an extravagance to a poor country; as an expenditure to be expanded only if things go well and to be retrenched if things go badly".
**The statement on National Policy of Education issued to the Parliament is far from what our country needs.

the role and significance of formal education of Primary, Middle and Matric levels for workers engaged in a modern printing press, regarding their productivity. After studying the gross earnings differentials of workers at the above levels of education, multivariate analysis is used to study the relative contributions of job experience age and education on annual earnings of the workers. Various null hypothesis are laid down and tested.

Chapter II states the objectives of the study, lays down various null-hypotheses and emphasises the need for the study. It also delimits the scope of the study. Chapter IV gives review of the existing literature on the subject outside India. To bring Indian contributions into limelight, the review of the empirical studies done in India is given separately in Chapter V. The life time earnings are analysed in Chapter VI and multivariate analysis is made to study the relative contribution of education, experience and age on earnings.

C H A P T E R II

The objectives of the investigation are as follows:

1. To calculate the life time earnings of various levels of education.
2. To find out the contribution of formal education on annual earnings.
3. To study the relationship between the earnings of two categories of press workers and their education, job-experience and age.

The following null hypotheses have been tested:

1. There are no earnings differentials between the workers having different levels of education e.g., Primary, Middle and Matric etc.
2. There is no correlation between education and earnings when the effect of experience and age over earnings is held constant.
3. There is no correlation between experience and earnings when the effect of education and age over earnings is held constant.
4. There is no correlation between age and earnings when the effect of education and experience is held constant.
- 5.* The partial regression coefficient giving the contribution of education over annual earnings when other two independent variables are held constant is equal to zero.

*The numbers 5,6 and 7 above may be regarded as subsidiary to the null hypotheses 2,3 and 4.

6. The partial regression co-efficient giving the contribution of job-experience over annual earnings when the contribution of education and age is held constant is equal to zero.

7. The partial regression co-efficient giving the contribution of age on annual earnings when the effect of education and experience is held constant is equal to zero.

8. The multiple correlation between the criterion earnings and education, age and job-experience is equal to zero.

The Need for the Study

1. There is a tremendous increase in the number of industrial workers in the country, as can be seen from the following Table:

Table 1

Relative Position of Industrial Workers in the Total Work Force

Figures in Millions

	1950-51	1960-61	1966-66	Rates of Growth
Total Workers	1.42	188	202.5	24
Factory Workers (Corporate sector)	3.4	3.6	4.7	2.2
Small Enterprises	9.1	12.5	15.9*	3.8

Source - Working documents of Planning Commission, New Delhi.

* It is assumed that the number of self-employed workers about which no reliable data is available equals the number of non-agricultural workers.

Though the increase in the number of workers in corporate sector, where sophisticated technology is being used is not very spectacular, its manpower requirements are much different from the quality of traditional labour force in India. The role of education and training seems to be very significant in this sector of the economy.

2. If we look at the investment pattern of our economy as indicated by the following table, the role of education emerges still more significant.

Table 2

Investment Pattern of Indian Economy

(Figures in Lakhs of Rupees)

	1951-52	1955-56	Rates of Growth (in percentages)
Total Outlay	25960	237446	18.6
Total Investment	56060	280946	11.6
(Public Investment)	19060	191446	(17.0)
(Private Investment)	37000	895000	(6.0)

Source - Working documents of Planning Commission of India.

Out of the total investment, the public sector investment is becoming more and more important. This fact is evident from the respective rates of growth of investment in public and private sectors - being in the ratio 3:1.

The formal education requirements of work force in the public sector is normally kept at a higher level as compared to the private sector. Hence cost-benefit analysis of such

enterprises is very essential if we are to assess our manpower needs more precisely and take national decision about workers formal education and job-training schemes. Some studies have already been done as reported by Mark Blaug in a very recent study done about India. These are discussed in some detail in the Chapter "Some Empirical Studies in India." Though worker's education scheme is a step in the right direction, it has given lesser importance to literacy programmes and covers a very small proportion of industrial workers.

It is therefore expected that only proper implementation of compulsory education followed by vocational education during the second stage may ensure the supply of well trained and literate workers for our industries.

At present empirical studies on large scale for assessing the profitability of formal education and practical training in general are very necessary in India. This may help change the attitude of policy makers and administrators who still treat workers education programmes as part of the general welfare programmes, completely disregarding its investment criteria.

Scope and Delimitation

1. This study will examine on the basis of cross-sectional data the differences in life time earnings of workers with primary and less, middle, Matric and above levels of education in the case of the occupation of Composing and Printing in United India Press, New Delhi.

2. The study takes only one press because of shortage of time to interview workers in more than one press.

3. The study takes only those workers who are in the organisation since 1965 onwards, because such people give a more stable sample.

4. The study does not calculate the cost of education because of limitations of time and workers being educated in different states of India having different costs of education.

5. The study does not therefore calculate the net-rates of returns over the investment in education.

6. This investigation attempts to study the relative contributions of education, job-experience and age, three predictors on the criterion earnings by multivariate analysis. But this Analysis is limited to only these three predictors though parental income s and education, rural, urban origins of the workers, their native ability, health existence of ^{Trade union} ~~unions~~, organisation of firm, etc. are closely correlated to earnings capacities and contribute to it.

Limitations of the Study

1. All the shortcomings attributed to cross-sectional data apply to its conclusions.

2. The sample chosen being very small it is not advisable to generalise much over the results of this study.

3. Low educational levels of the press workers on the whole and the printing category specifically, might have biased the responses of the workers to the interviewer which may booster up the error variable, besides the usual errors of estimation of partial regression co-efficients and partial co-relations of II order.

4. The assumption about combining the primary level of education with the illiterates and persons with education up to two, three or four years on the one side and Matric and B.A. on the other is also quite far fetched. But it is necessary to do so for the present study, as there are very few cases in each category in the respective age groups.

5. Similarly, the two categories of workers taken may be better subdivided into more specific categories. This could provide a clear picture of the effects of the three predictors on the criterion earnings. But this could be possible only with a much larger sample involving more printing presses in the corporate sector.

C H A P T E R I I I

A REVIEW OF LITERATURE ON EARNINGS AND EDUCATION

This study makes an attempt to establish workers earnings differentials at differentials at different levels of education. As such it is a part of the general system of cost benefit analysis. Cost benefit analysis is a method of deciding whether a particular project is desirable to be taken up strictly on economic criteria, social and political considerations have their own importance in any decision making. But such considerations will be outside the scope of this method.

In the application of the cost benefit analysis, the costs and benefit of a project are enumerated and evaluated and the ratio between the two is deduced. The higher this ratio for a project, the more profitable will it be to accept it on economic grounds.

We find in the works of some economists in earlier times, stray attempts at measuring the value of man and his labour. These attempts can be said to contain traces of the modern cost-benefit method. But a systematic approach on this basis is a very recent development.

Most of the work in this connection has been done in the last three decades by a number of economists. The most prominent among them are: J.R. Walsh, T.W. Schultz, G.S. Becker, Houthakkar, W.L. Hensen, Mark Blaug, H.P. Miller, J. Morgan and Martin David and John Vaisey.

A review of the works of these authorities will be of considerable interest in the content of the present study. In undertaking the review, main emphasis has been on the aspect of monetary benefits rather than on costs since the study too has not gone into the aspect of costs.

The most significant considerations taken in the review are the following:

1. Classification of benefits of a particular level of education;
2. The measurement of these benefits;
3. Partialling out the effect of other variables than education on gross earnings by multivariate analysis.

1. Classification of benefits

T.W. Schultz, G. Becker and others called by John Vaizey* as Chicago Economists broadly divide the benefits of education into:

1. Direct
2. Indirect.

Vaizey compares these Indirect benefits to "External Economics" concept of Marshall and Pigou. Like Marshall and Pigou they believe that some Indirect benefits are measurable and may be called Monetary benefits. In the case of Direct benefits, again the dichotomy between measurable and non-measurable or monetary and non-monetary, holds good.

The measurable private or direct benefits are the earnings differentials associated with extra-education, after

*J. Vaizey, The Economics of Education, (London Faber and Faber, 1962), Chapter III.

discounting these for unemployment mortality and taxation rates etc. Vaisey concedes the validity of such measurement on the average though individual cases may be quite divergent from the norm set by this procedure. R.C. Sharma* and B. Weisbrod also make a similar division of benefits into Internal and External. They further sub-divide them into Monetary and Non-monetary benefits.

What Mark Blaug calls "Fringe Benefits" are annual and incentive bonus, free and cheap accommodation subsidised health schemes and pension rights etc., He even includes dowry payments by the brides family in this category.**

Another monetary or financial benefit of education given by Mark Blaug*** is the lower costs of administration, because it helps to maintain better law and order situation.

But the validity of it^{is} subject to criticism specially when we see a higher rate of crime and violence in developed countries of Europe and in U.S.A. where education is more wide spread. The educated also demand a higher share of the total public expenditure on social services in the developing economies.

Thus it can be concluded that benefits of education can be divided into: 1. Monetary and 2. Non-Monetary. Some of the

*See R.C. Sharma's "A Benefit Cost Analysis of Teachers Education (unpublished Doctoral Dissertation, New York, Teachers College, Columbia University, 1967).

**Mark Blaug and Others, "Causes of Educated Unemployment in India," (Mimeographed) 1968, Chapter VII, Pp.81-82.

***M. Blaug, "Rate of Return on Investment in Education in Great Britain" The Manchester School, XXIII (September 1965).

Monetary benefits are measurable while some are beyond this treatment e.g. the "fringe benefits," of M. Blaug, with the exception of annual bonus and accommodation.

Monetary and Non-monetary benefits can further be divided into:

I. Social E. Private.

II. Measurement of Benefits

Most of the economists adopted cross-sectional approach for measurement of monetary benefits. On the assumption that cross-sectional data can be converted into longitudinal data.

In 1935, J.R. Walsh* calculated life time earnings for various levels of past secondary education, taking median incomes of various age groups according to their respective levels of education. He multiplied the median incomes with ratios of the survivors and the employed and then discounted them to arrive at the present value of the life time earnings.

B.F. Kikker** criticised him on the ground of inconsistent test of the hypothesis of "competitive equalising market." Kikker also did not agree with the conclusion that earnings differentials are due to differences in levels of education. However, in regard to Kikker's second criticism, it may be pointed out that Walsh does identify the existence of factors other than levels of education affecting earnings differentials. But he assumed that in the case of a sufficiently

*J.R. Walsh "Capital Concept Applied to Man," Readings in Economics of Education (UNESCO, 1968) Appendix Table 3, Pp.471-472.

**B.F. Kikker "Human Capital" Journal of Political Economy, October 1966.

large sample, the effect of such variables e.g., ability, place of work, health, luck, etc. will be eliminated for an "average" individual.

H.P. Miller* while attempting to measure the life time incomes makes a comparative study of estimates based on 'Cross sectional' approach and on "Cohort Analysis." According to him life time incomes are under-estimated when based only on cross-sectional data as it does not take into account the effect of economic growth on such incomes. By taking successive decennial censuses cohort approach is able to reflect changes associated with economic growth. But while the cross-sectional data is not affected by changes in prices, employment opportunities and wage rates, the cohort approach is subject to this limitation. Mark Blaug** also is of the similar opinion about cross-sectional data when he says "When all is said and done cross-sectional data have a distinct advantage over genuine life-cycle data in that they are free from the influence of the Trade cycle and implicitly provide estimates in money of constant purchasing power." Mark Blaug gives a second advantage of cross-sectional approach. According to him average person forms an idea of the monetary benefits of extra education by only "Cross-section comparisons."

*H.P. Miller "Income in Relation to Education," American Economic Review, December 1960.

**M. Blaug, "The Rate of Returns on Investment in Education in Great Britain," The Manchester School, XXXIII, September 1965, p.224.

Miller, after taking note of the special limitations of both methods, however, holds that both have their respective applicability. If the aim is to study the comparative profitability of various schemes of education, cross-section approach is better specially when the income measures are free from the effect of other extraneous factors and can be said to be "Caused" only by education. But if the income figures only show the association between income and education, along with all the other factors, the effect of economic growth should not be ignored as it is one of the significant factors affecting incomes."

In conclusion it may be pointed out that income differentials and present values of life time incomes when based on cross-section data have their importance when educational planner is called upon to determine priorities for various educational schemes. Alongwith other social and demographic considerations, they provide economic rationale about various educational projects and thus provide guide lines for the policy maker.

*See his Graphical Presentation of Cohort and Cross-section Data in Figure 1., p.841, "Life Time Incomes and Economic Growth," American Economic Review, December, 1960. Also see pp.835-837. Where Miller first used the following formula for measuring the present value of life time income taking cross-section data.

$$V_{18} = \sum_{n=18}^{75} \frac{Y_n W_n P_n}{(1+r)^{n-18}} \quad \text{Where}$$

Y_n = average income at age ' n '

W_n = Proportion of persons at age ' n ' with income.

P_n = Probability of surviving at least one year at age ' n '.

r = Discount rate, X = working life span which he assumed to be 18-75 years.

He modified it when considering Cohort approach to

$$V_{18} = \sum_{n=18}^{45} \frac{Y_n W_n P_n (1+X)}{(1+r)^{n-18}} + \sum_{n=46}^{\infty} \frac{Y_n W_n P_n (1+Y)}{(1+r)^{n-18}}$$

Where X and Y are the income gains associated with economic growth.

T.W. Schultz* calculated additional life time earnings on the basis of H.P. Millers data.

Table 1

Rates of Returns on Educational Levels in U.S.A.
(Figures in Dollars)

Sr. No.	Years of School Completed	Additional Life Times Incomes.	Costs	Rates of Return
0	1	2	3	4
1.	College	151,000	13,780	10.96
2.	High School	70,000	5,930	11.80
3.	Elementary Education	47,000	1,160	40.20

The above ratios show that elementary education was the most profitable of all in U.S.A. at the point of time under study.

By giving weights to Elementary, High school and College education at .27, .45, .28 respectively he deduces that the minimum return on the whold of educational stock stood at 17.27% in the U.S.A.

Houthakkar** also adopts the cross-sectional approach. He selects representative incomes by inspection of data and assumes Pareto type of distribution for incomes above \$10000.

^{T.W.} Schultz, T.W., "Education and Economic Growth," Readings in Economics of Education, U.N.E.S.C.O, 1968, p.304.

**H.S. Houthakkar, "Education and Income," Review of Economics and Statistics, XLI (February 1959) Pp.24-28.

He calculates co-efficients of variation in order to provide some insight into the variability of income within each age group. His graphical representation of after tax incomes shows a positive correlation between education and income with the exception of incomes below the age of 20 years. Maximum mean income level is reached in 45-54 age group for all levels of education after which it falls slowly for some time and then sharply. His third conclusion is that "the income advantage of better education does not apply to their early years." He arrives at this by comparing incomes at various levels of education before and after discounting and adjusting for the tax.*

Becker's** procedure is quite similar to that of Miller and Houthakker. He uses mid-points of all income class intervals to calculate the means for various age groups, and Pareto Distribution for calculating the mean for the open and class interval. His conclusion about this differs from that of Houthakker as his means rise with higher education and age levels.***

He also discounts these estimates for mortality, economic growth and taxation. His estimate of rate of return of 12% on college education in U.S.A. is applicable to an average person enrolled in the college. It is higher for white, urban male college graduates and lower for non-white, rural, women etc.

*Ibid, p.27 and 28.

**Becker 1964, Human Capital (New York: National Bureau of Economic Research 1964).

***See Ibid, Table A-2, p.162. Here Becker gives a table comparing his estimates of income differentials with those given by Miller and Houthakker.

He also concedes that these rates may be overestimates as other variables such as ability, socio-economic background are ignored, but they contribute to earnings differential of various levels of education. But he concludes by saying "College education itself explains most of the unadjusted earnings differentials between college and high school graduates."* Becker's conclusion seems to be quite convincing as variables e.g. I.Q. Fathers education and occupation, personality, motivation and family upbringing etc. go into inducing the resultant entry to the college itself.

Speaking about investment in human capital in general he says that the effect of such investment is double. At younger age, earnings are lower as costs are deducted from them while at elder age, earnings are higher as returns are added to them.**

Mark Blaug*** studies life time earnings estimated from Cross-sectional data classified by Terminal education and age.

After that he discusses how much of the gross earnings differential associated with extra education are actually attributable to it. Here he assumes ' λ ' to be the fraction of the observed differential, attributable to extra education. He gives the following limits for λ .

$$0 \leq \lambda \leq 1$$

Cost of extra education = C , incurred at $t = 0$

Present worth of this differential = $\frac{C}{r}$ ****

*Ibid, p.88

** Ibid, See Becker's Conclusion of his theoretical analysis.

***Mark Blaug "The Rate of Return on Investment in Education in Great Britain," Manchester School of Economics (London 1965).

****Ibid, p.286.

His conclusion is that earnings differential increase with age at a decreasing rate and then level off at about the age of fifty.

But as J. Morgan and Martin David* point out cross-sectional data are only rough indicators of future earnings pattern. If the career of a 20 years old is observed, his earnings might be found to be of a much higher level at the age of fifty than will be calculated by cross-sectional data.

Mark Blaug portrays his findings about rates of return in his Chart III** on investment on education. His estimates about social rates of return are as follows:

1. Three years of education beyond 15 years = 12½%.
2. For six years of secondary education = 8%
3. Higher education = 6%.

For higher education he is of the opinion that actual yield is nearly 9%, with the students group being more homogenous at the level as regards measured ability.***

About Private rates of return his estimates are:

Three years of Secondary School Education = 13%

Three years of higher education = 14%

These yields are about 50% higher than those that can be earned in U.S.A. economy by investing on equities and debentures. He has however standardized the earnings by using an Alpha co-efficient = .66, because of different ability and socio-economic background of secondary school students.

*See J. Morgan and Martin David's "Education and Income," Quarterly Journal of Economics, August 1963, P.4

**See his Appendix in "The Rate of Return on Investment in Education in Great Britain" Manchester School (London 1966), p.259.

***Ibid, p.216.

J. Morgan and Martin David also take cross-sectional data, but take hourly earnings instead of annual earnings taken by other economists. The reason for this given by them is that annual earnings hide the non-monetary benefits of education e.g. leisure. They maintain that hourly earnings understate while annual earnings over-state the true differences in benefits of extra education.

Their option for higher rate of discount is to offset the under estimate of future earning levels and differentials as they say that cross sectional data are only rough indicators of future earnings. According to them another benefit of education which is ignored is the necessary foresight and flexibility to ward off unemployment besides affecting man's earning capacity.*

III. Multivariate Analysis

The need for multivariate analysis arises because of the problem of finding the pure effect of education on the earnings criterion, when the effect of other variables is held constant.

John Vaizey** a wellknown critic of the rate of return approach however says that there is multiple correlation between various socio-economic factors, access to educational opportunities and job opportunities, motivation and other psychological factors and a person's earning capacity. He considers native ability as the most crucial factor of all these

*J. Morgan and M. David, "Education and Income," Quarterly Journal of Economics, 1963, Pp.423-424.

**John Vaizey, "The Economics of Education," Faber and Faber, London 1962, Chapter III, p.45.

affecting a person's successful career. In a country like India, where class and caste prejudices are quite strong, what Vaizey calls as "Chicken and egg controversy" about the causal relationship between income and education may be more relevant.

But Mark Blaug in his defence of the rate of return approach, analyses the conclusion arrived out by Multiple correlation among the income determining variables. He says that factors other than age and education only explain "40% of the gross unadjusted earnings differential between High school and College graduates in the age group 18-34 and only 12% in the age group 35-74!"

Thus it can be concluded that rates of return on educational investments are good indicators as to the desirability of a particular educational scheme.

J. Morgan and M. David** give the following reasons for attempting to isolate the effect of education on earnings

"1. There are many inter-correlated factors affecting a man's earnings.

2. These factors are not all at the same stage in a causal chain."

They use the device of multiple correlations to study the pure effect of education on earnings and came to the conclusion that even this method does not give a very accurate picture of

*See his "Rate of Returns on Investment in Education in Great Britain," Manchester School of Economics and Social Studies, (London 1965), Pp.212-214.

**J. Morgan and M. David, "Education and Income," p.424.

the effect of education on earnings. They have cited the example of a father's education on sons earnings and are of the opinion that there can be a causal relationship only if fathers education directly affect sons earnings or his occupation and not otherwise. They arrive at the following conclusion, "The Truth lies somewhere between the unadjusted gross differences in earnings for those with different levels of education on the one hand, and the net estimates from the multivariate analysis."

Secondly they maintain that multivariate analysis takes into account far too much the effect of factors other than education and in the process of elimination of the effect of these factors tends to underestimate the effect of education on earnings differentials.

The third point that can be raised in connection with multiple regression analysis is regarding the underlying assumptions of this method. The most important of these is that variables do not interact with one another and that their combined effect is the sum total of their separate effects. But as we see in life and it can also be statistically varified, these variables are closely inter-related.

CHAPTER IV

SOME EMPIRICAL STUDIES IN INDIA

The economists in India have also started to explore the economic contribution of education. A.C. Harberger from the U.S.A. made a pioneer study on the basis of data from Hyderabad Survey 1956-58. His study was followed by U.N. Kothari, I.C. Hussain and Walla Counden. It is only recently that Mark Blaug completed his study about the rates of return to various stages of Indian education. Usual technique of rate of return to investment in education has been adopted by these authors.

Main Findings

The main findings of studies based on these surveys are discussed below:

A.C. Harberger* compares the rates of return on investments in physical capital and in three levels of education;

- (i) Four years of secondary school over Primary;
- (ii) Six years of college education over Secondary;
- (iii) Secondary and College education taken together over Primary.

Age distribution^{was} assumed by him for constructing age-education earnings profiles as Hyderabad Survey did not provide data for age. His assumption for the ages at which peak earnings are reached for Primary, Secondary and Higher education are 30, 35, 40 years respectively. On this basis, he has

*A.C. Harberger "Investment in Men Versus Investment in Machine, the Case of India" Education and Economic Development, by C.I. Arnold and M.J. Bowman (Chicago, 1965).

computed ratios of peak earnings to average over life time which are as given below*:-

^{peak & Average earnings}
Table 1
Ratios of Return on Levels of Education

Sr. No.	Level	Ratios
1.	Primary	1.11
2.	Secondary	1.14
3.	Graduate	1.20
4.	Post-Graduate	

He found that the rates of return for physical capital vary from 17 to 25% according to some adjustment** made by him. He considers these rates to be under-estimates.

According to him, the investment in college education is the most profitable giving the highest rates of return in education i.e. between 16.3 to 16.9 per cent. Secondary education is the least profitable giving rates of return between 10 to 11.9 per cent. Thus he concludes that in India investment in physical capital is more profitable than the investment in education.

Nalla Gounden*** based his study on data from Urban Income and Saving Survey of the N.C.E.A.S. (1960). He has classified

*Ibid, table 8, p.24.

**Ibid, see his discussion on adjustments, A,B,C,D at p.14 and table 2 at p.17.

***A.M. Nalla Gounden "Investment in Education in India," Journal of Human Resources, Summer 1967.

the benefits of education into (i) Private and (ii) Social and then again sub-divides them into (1) Monetary (ii) Non-monetary. Because of the difficulty of including all these benefits while estimating rates of return, he only considers the usually taken earnings differentials of various educational levels. He calls them the "social returns to education."

His adjustment ratio is very much akin to the Alpha value given by Mark Blaug for India i.e. 0.5. This ratio is only arbitrary and is used by him to find out the pure effect of education over earnings.

The rates of return calculated by him for various levels of education are given below:

Table 2
Rates of Return on Levels of Education

Sr.No.	Level	Returns
0	1	2
1.	Literate over illiterates	15.9
2.	Primary over Literates	17.0
3.	Middle over Primary	11.8
4.	Graduate over Matric	7.0

Composing these rates with Harberger's estimates for Rates of return on investments in physical capital which are 17-26 per cent, he concludes that physical capital is more profitable in India. His conclusion is similar to that drawn by Harberger in his study. But his rate of return on Primary education is comparable to the rate of return on physical capital. His second

main finding is that constitutional directive of free and compulsory education for the children up to 14 years must be speedily implemented.

Thirdly, the lowest rate of return on Bachelor degree over Matriculation, is according to him, the "Economic equivalent" of the criticism of Indian educational system being "Top Heavy." This he says is the cause of educated unemployment in India.

V.M. Kothari² based his study on data from Survey of Bombay City. His procedure is similar to Harberger's but he tried to eliminate the influence of commercial and business ownership by subtracting the total incomes of this group from the total incomes of that educational level and then computing the average incomes for the remaining number of earners. His conclusion about Arts and Science graduate education being the least profitable is similar to that of Nalla Gounden and contrary to Harberger's conclusion for this level of education.

He also constructed age-education - earnings profiles with chief characteristics as given below:

Characteristics of earning structures.

Table 2

Sr.No.	Levels of Education	Age at which peak are reached Incomes	Ratio of peak earnings to average life-time incomes
1.	Middle	32	1.17
2.	Matriculation	41	1.41
3.	All Graduates	50	1.49
4.	Arts and Science Graduates	50	1.49
5.	Tech and Eng. Graduates	50	1.47

Sources: ¹ Ibid, p.135.

We find that both the age of peak earnings as well as the ratios of peak earnings to average life time earnings are higher than those given in Harberger's study. This shows more and better chances of rise in a city like Bombay when compared to a relatively backward place like Hyderabad.

The difference between social and private rates of return is the highest in the case of technical and engineering education i.e. 3 per cent. This difference according to him explains the great demand for this education. However, recently this picture must have changed because of unemployment spreading even among people of this level of education. But still in the absence of any other avenues of employment, the demand for engineering as well as for general degree is quite high in India.

Miss Husain* has also reached at similar conclusion about general university education having very low returns, as those of Nalla Gounden and Kothari. But she even includes professional education in this category. She however suggests that the improved efficiency of the educational system and its skill orientation may improve the rates of return on education in India. She also points out that wages may be lower than marginal productivity in India and thus an upward revision of pay scales of the educated may also make educational investment more profitable.

She has also computed co-efficients of correlation between per capita income and levels of education in States in India.

* Miss I. E. Husain "Returns to Education: An Estimate" Education as Investment by Baljeet Singh, (Delhi, 1967).

The only significant correlations are between higher technical and non-technical education and per-capita incomes. But we cannot conclude on this basis that only higher education has its investment aspect. The limitation according to her "Arises on account of gestation period, 'spill-in' and 'spill-over' effects and lack of balanced complementary investments in various States."

Mark Blaug and others** have compared the age-education earnings profiles of all these city surveys and of industries studies on the criterion of age at peak earnings and relative steepness of the profiles. He concludes that Harberger's estimates of these ratios as well as his assumption about age at which peak earnings are reached are the lowest in comparison to other such profiles. He has given certain "Characteristics" of "Well-behaved" age earnings profiles. These are:

(a) "Earnings are highly correlated in the education; earnings rise at every age with each successive level of education and there is no crossing of profiles.

(b) All profiles rise with age to a single peak and then fall until retirement.

(c) The profiles for higher educated individuals are steeper than for the less educated.

(d) The age at which earnings reach their peak is later, the higher the level of education."

* Ibid, p.146.

**M. Blaug, Causes of Educated unemployment in India, (Xeroographed) 1968, Chapter VII "Effects of Education on Incomes."

The average earnings are lower in the case of Hyderabad survey when compared to the average earnings of Delhi and Bombay Samples. But though the absolute level of earnings differ a lot, the relative earnings are very similar in the case of all these surveys.

He says that this is clear from the approximate ratios of average life time earnings between various levels of education in all the surveys.

This is clear from the approximate ratios of average life time earnings between various levels of education in all the surveys.

Matriculation and Primary = 2 (roughly)

Graduates and Matriculation = 0.6

Engineers and other Graduates = 2

He gives three other financial benefits of education e.g.,

1. Annual and Incentive bonus.

2. Free or cheap accommodation

3. Subsidised health scheme or pension rights.

4. Dowry payment by the brides' family. He, in a way, marvels at this social evil when he says "Indian families show a real appreciation of economic realities when selecting a bride or a bride groom." (p.21).

Training and Earnings

While discussing the effect of training* on earnings, he presents Becker's concepts of "General" and specific training, in

*Ibid, Chapter IX, Pp.19-26.

the form of "on-the-job-training" and "off-the-job-training." The distinguishing feature between the two is bearing of the cost of training. The "General" or "On-the-job" training is like formal schooling and the costs are borne by the trainees in the form of lower present earnings in the hope of higher future earnings. In the case of "Specific" or "Off-the-job" Training costs are borne by the firm which later tries to cover part of the cost by paying the workers less wages than their marginal productivity. Thus his whole analysis is exactly like Backers.

From the above distinction, Blaug concludes that it is the "General" type of training which makes the problem of estimating rates of returns on educational investment complicated.

He concludes his discussion on the effect of training on earnings by saying "Some, although surely not all, training may be a joint input with capital or a joint output with the final product."* It is this which makes it impossible for the firms to pass on the training costs to the workers which was the chief distinction between general and specific training.

The other factor which affects the incidence of costs is the mobility of the labour force which is very much less in India and thus the firms are in a better bargaining power here, to recoup a part of the training costs from the workers later.

His main conclusions are:

(1) Though the expected rates of return depend on certain assumptions this problem is not unique to rates of return in Education and arises when estimating rates of return for Industrial

*Ibid, Chapter IX, p.24.

investments generally.

(ii) In India, B.A., B.Sc., B. Com. are not profitable investments and their rates of return are much lower than other educational investments.

(iii) Unlike Harberger he maintains that generally educational investments are showing better private rates of return than the alternative private rates of return though social rates of return on general higher education tends to be lower than the alternative social rates.

(iv) His conclusion about primary education is similar to that of Halla Gounden that it is the most profitable educational investment in India.

(v) The social rates of return are generally lower than the private rates of return. But in the case of primary and middle level and engineering education,

↓ The differential is quite large.

C H A P - T E R V

PROCEDURE AND METHODOLOGY

Selection of the sample United India Press was selected to study the role of education and earnings behaviour of the press workers. The following reasons prompted us to select this press.

1. This is one of the big, modern presses in Delhi, which takes up both News Printing and Job Printing.

2. It uses the most representative technology at present used in the corporate sector of the press industry in India.

3. The number of workers employed is neither too small nor too large for the purpose of the present study.

The sample chosen consists of 106 workers, employed in the press since 1965 and directly working on the machines.

Data Collection

For collecting data a schedule was designed and workers were interviewed by the investigator personally. A copy of the schedule is attached in the Appendix.

Besides education, information on job-experience, age, socio-economic background, work-load, job satisfaction and present as well as past earnings is collected.

As already pointed out while deciphering the limitations of the study in Chapter II, information on other variables e.g., health, ability, etc. is not collected as it falls out of the scope of the present investigation.

Technical Aspects of Adjustment in Data

Choice of Weights

It is decided to give the weight of 1 to one year of formal education as is indicated below:-

Weights to Levels of Education

Table 1

S.No.	Level of Education	(Weights) No. of Years
1.	Primary	5
2.	Middle	8
3.	Matric	10
4.	Intermediate	12
5.	B.A.	14

Similarly for every year of experience and age, weight of '1' is assigned.

Life Time Earnings

The whole sample is divided into two categories:

1. Printing
2. Composing

In the occupation of Printing, there are only 44 workers out of the whole sample. These workers are divided into the following levels of education according to age.

1. Primary and Less.
2. Middle and above.

In the case of composing, there are 62 workers in all. The following levels of education are identified here:

1. Primary and Less.
2. Middle
3. Matric and above.

The reason for the above division of levels of education is that composing requires higher amount of education than printing. In order to calculate life time earnings, the cross-sectional data collected by the investigator is utilised both for the composing and printing occupations. Assumption of conversion of this data into longitudinal data is made here.

The average used for finding the mean incomes of each age group is Arithmetic Mean.

Gross Earnings differentials for each level of education in both the occupations are also deduced.

Graphical Representation of the behaviour of average earnings of all the age groups according to their educational level is also given.

Multiple Regression Model is fitted to the data, treating education, age and job-experience as predictor variables and earnings as criterion variable.

The results of the procedure followed are presented and analysed in the next ^{two} Chapter.

C H A P T E R VI

ANALYSIS AND INTERPRETATION

I

Educational Level of Workers

Information about the years of schooling of 44 workers in the category of "Pringing" is given in the Table 1.

Table 1

Distribution of Pringing Workers According to
Number of Years of Schooling

Sr.No.	No. of Workers	Years of formal education	Level of Education
0	1	2	3
1.	5	Zero (illiterate)	I
2.	7	Less than Primary	
3.	9	Primary	
4.	5	Between Primary and Middle	
5.	9	Middle	II
6.	5	Between Middle and Matric	
7.	3	Matric	
8.	1	Intermediate	
Total	44		

From the table it is observed that out of 44 workers 26 had educational level below middle standard. This number is about 59 per cent of the Total workers. Therefore, for the purpose of analysis of education and earnings data, we have divided all workers into two categories.

1. Primary and Less; 2. Middle and above.

Here all those who are less than middle are considered equivalent to primary. Similarly all workers not passing Matriculation exam or tenth class of a school are considered only Middle.

However it would not be out of place to mention here that the most highly paid worker in this category is illiterate, sheer native ability may be responsible for his spectacular achievement.* This is an exceptional case and should not be taken into account in general analysis.

The following table gives the educational distribution of workers in the category of composing.

Table 2

Distribution of Composing Workers according to
Number of Years of formal Education

Sr.No.	No. of Workers	Years of formal education	Levels of Education
0	1	2	3
1.	3	Less Primary	
2.	2	Primary	I
3.	6	Between Primary and Middle.	
4.	11	Middle	
5.	18	Between Middle and Matric	II
6.	15	Matric	
7.	7	Above Matric	III
	<u>62</u>		

*The investigator found that this worker was picked up by the German Technicians who came to install this printing press. They arranged to send him to Germany for further technical training. At present he is working as production engineer and Rotary incharge in the press.

As is clear from the above table, only 17% of the workers in this occupation are below Middle, while 47% are middle but below Matric and 36% are having Matric and above education. Hence three levels of education are taken in the case of composing. These are:

1. Below Middle; 2. Middle; 3. Matric and above.

Out of these Middle looks to be the typical level of education for this occupation. For a comparative picture of the levels of education for both the categories of workers, these percentages are very revealing. This is shown in the following table.

Table 3

Percentage of Workers in each Category in the Three Levels of Education Chosen for the Study

Sr.No.	Levels of Education	Composing	Printing
0	1	2	3
1.	Below Middle	17	59
2.	Middle and Below Matric	47	32
3.	Matric and above.	36	9
4.	Total	100	100

This means that the general level of education is much higher in the case of composing than in the case of Printing.

II

Life Time Earnings

The mean incomes of each age group and educational level are the Arithmetic means. Table 3 below shows these mean annual earnings according to age and educational levels.

Table 4

**Average Annual Earnings of Workers Employed in
Printing According to Age-Groups**

(Amount in Rs.)

Sr.No.	Educational Levels Age Groups	<u>Primary and Less</u>		<u>Middle and More</u>	
		No.	Average Annual Earnings	No.	Average Annual Earnings
0	1	2	3	4	5
1.	20 - 24	5	2227.6	2	2147.5
2.	25 - 29	6	2514.2	7	3167.2
3.	30 - 34	3	2606.7	3	3808.3
4.	35 - 39	5	3036.0	4	3941.5
5.	40 - 44	5	4778.0	2	5915.0
6.	45 - 54	1	2968.0	-	-
7.	55 - 65	1	1875.0	-	-
8.	20 - 65	26	2514.5	18	3605.1

With the exception of age-group 20 - 24, average incomes in Middle level of education are higher than those of Primary level of education. The average earnings are continuously rising with age in the case of Middle level of education, while in the case of Primary earnings rise up to the age group 40-44 and then fall. The reason seems to be lesser educational levels of older workers. This hypothesis is further strengthened because of absence of any worker having Middle or above education in the last two age groups.

The average of Rs.4778.0 for the age-group 40-44 is inordinately higher than the other averages. The reason is the inclusion of

here of an exceptional case with no formal education but having the highest annual income in the whole press i.e. Rs.11690.

Life time Earnings of the above two levels of education in Printing are calculated on the assumption that cross-sectional data can be converted into longitudinal data. These Life Time Earnings (L.T.E.) are as follows:

- | | | |
|---------------------------------------|--------------|---------------|
| I. L.T. Earnings of Primary and Less | = | Rs.110,805.5 |
| II. L.T. Earnings of Middle and Above | = | Rs.143,147.5 |
| | Differential | = Rs.32,942.0 |

These are the gross earnings and differentials and are not discounted for mortality, unemployment and economic growth, because it falls out of the scope set for the present investigation. Attempt to find the present value of this differential has also not been made.

However, Null Hypothesis No.1 laid down in Chapter II that there are no earning differentials between workers having different levels of education is rejected in the case of Printing occupation.

The mean annual incomes of each of the above educational level according to various age-groups are now computed for composing category workers of the press. Again the average used is the Arithmetic mean. This is shown in table 5.

Table 5 shows that behaviour of earnings does not follow the usual pattern of age-education-earnings profiles* except in the case of Matric and above where earnings are rising with age and ultimately reach a peak.

*This can be classified better by graphically depicting the earnings behaviour. An attempt is made to do that in the next section.

Table 5

**Average Annual Earnings of Workers Employed
in Comparing According to Age-Groups**

(11) 1951-52

Sr. No.	Educational Levels Age Groups	Primary and Less		Middle		Matric and above	
		No.	Average Ann- ual Earnings	No.	Average Annual Earnings	No.	Average Ann- ual Earnings
0	1	2	3	4	5	6	7
1.	20 - 24	1	3220.0	3	2813.3	2	2410.0
2.	25 - 29	-	-	8	2681.1	8	3301.2
3.	30 - 34	4	2050.0	5	3004.0	5	4414.0
4.	35 - 39	3	3002.3	6	3812.5	4	4460.0
5.	40 - 44	2	3700.0	2	2844.0	2	4990.0
6.	45 - 54	-	-	3	4355.0	1	5220.0
7.	55 - 65	1	4880.0	2	6426.5	-	-
8.	20 - 65	11	3075.0	36	3479.0	23	3924.0

In the case of Primary level, the new entrants appear to have a better start than those who are already in the profession for the last 20 years or more. This is clear from the higher average annual earnings for the age group 20-24 for than in the next three age groups in the case of Primary level of education.

In the case of Middle level, earnings follow a zigzag path, falling and then rising between second and third age groups, again rising and falling between fourth and fifth age groups and then there is a steep rise till retirement. There is no illiterate worker here and workers with higher incomes are having nine years or above of formal education.

The representative average incomes of each age-group are higher for higher levels of education, with the exception of age -group 20-24. Where the average for Primary or I level of education is higher than those for the II level and III level.

The Life-Time-Earnings are calculated in the same way and are subject to the similar assumptions. These are given below according to the respective levels of education:

Table 6

Life Time-Earnings and Earnings differentials
According to levels of Education for Workers
in Composing

Sr.No.	Level of Education	Life Time Earnings	Differential
1.	I Primary and Less	160160	
2.	II Middle	186410	26250
3.	II Matric and Above	201075	14665

The higher earnings differentials for II level of Education corroborates our previous interpretation that Middle is the representative level of education for this press. The above earnings differentials show that the Null Hypothesis No.1 given in Chapter II is also rejected in the case of composing occupation of United India Press.

Out of these earnings differentials only a certain fraction can be attributed to education, while the rest may be the effect of factors other than education. Denison* has assumed that fraction to be 3/5 in the case of America while

*E.F. Denison "Measuring the Contribution of Education (and the residual) to economic Growth." Residual factor and Economic Growth, Paris, May 1963.

Mark Blaug* gives an () Alpha value of .66 for England.

In a recent study for India Mark Blaug** has taken an Alpha value of .66 and .5. A.M. Nalla Gounden*** also assumed this value to be .5 for India.

Average earnings for the whole of the sample and for both the occupations separately are given in Table 7.

Table 7

Average Annual Earnings for Printing and Composing
and for the whole press according to levels of education
(Rupees)

Sr. No.	Educational Level Occupations	Primary and Less	Middle	Matric and Above
0	1	2	3	4
1.	Printing	2614	3182	5721
2.	Composing	2973	3479	3924
3.	For the Whole Press	2721	3148	4141

III

Graphical Representation

Age education-earnings profiles for both the occupations are given in Figure 1 and Figure 2.

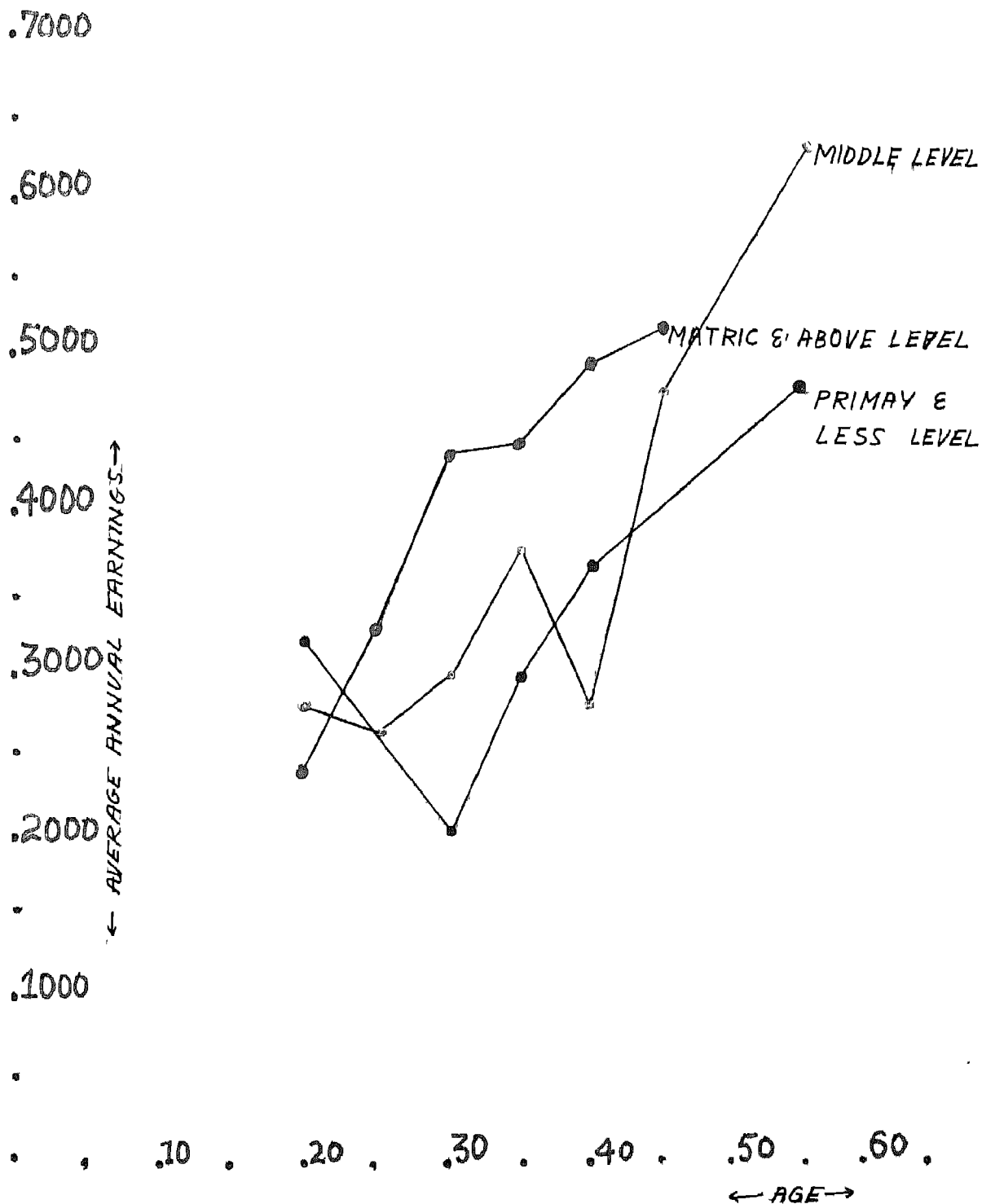
*Mark Blaug, "Rate of Return on Investment in Education in Great Britain," The Manchester School, XXIII (September 1965).

**Mark Blaug and Others, "Causes of Educated Unemployment in India" (Mimeographed 1968), Chapter IX, Pp.7-8.

***Nalla Gounden "Investment in Education in India," Journal of Human Resources, Summer 1967.

CHART-1

AGE-EDUCATION EARNINGS COMPOSING WORKERS



In the case of composing the lines of primary and less and middle levels of education are following a zigzag pattern, with more crests and troughs in the case of middle level of education.

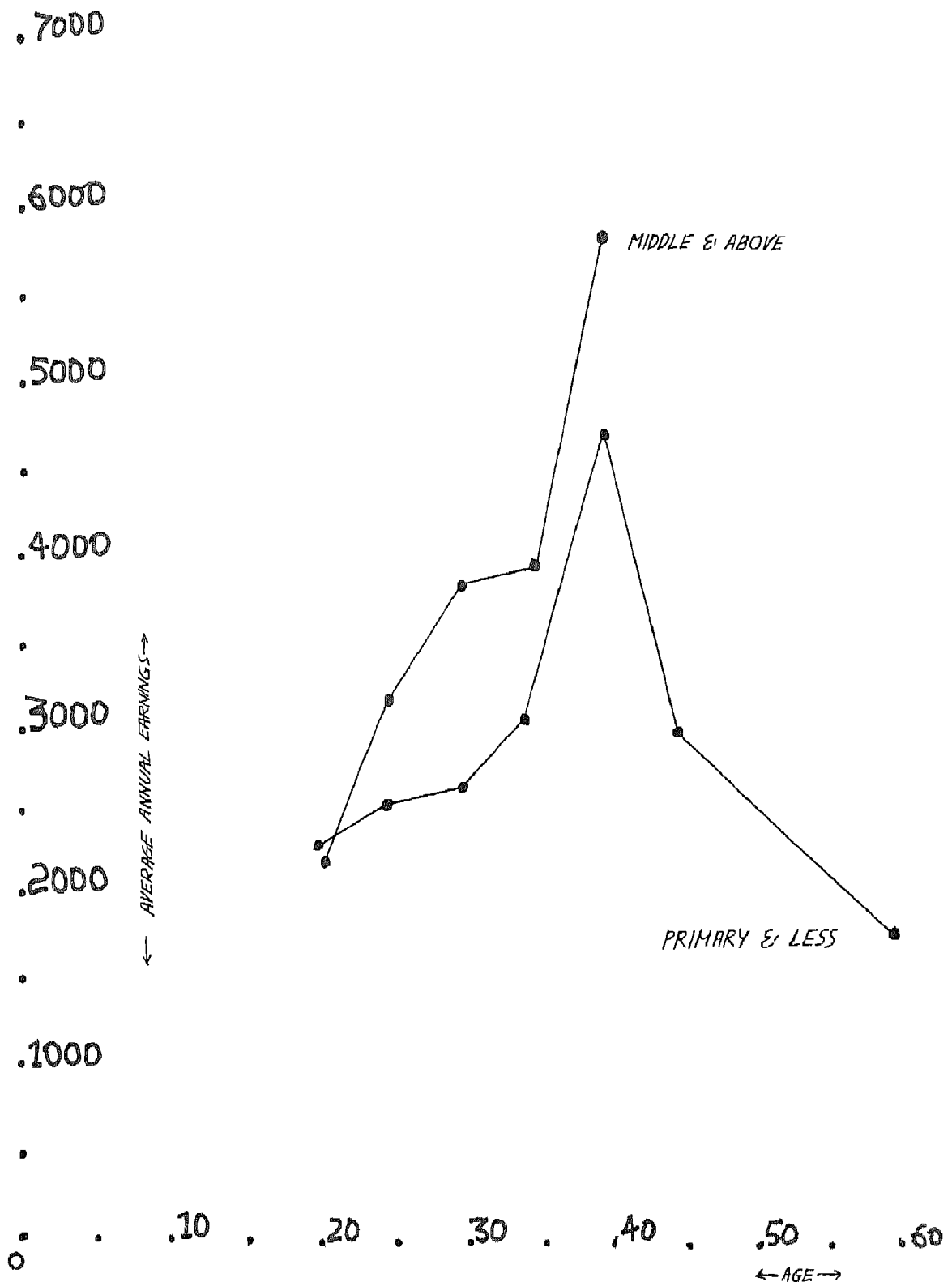
Average earnings of the age group 20-24 is the highest in the case of primary level. The reason is that this average is not representative of the group, there being only one worker in this age group and level of education.

The age at which peak earnings are reached is above sixty in the case of primary and middle while for Matric and above it is 45 years. The lines do not fall after reaching the peak. There is crossing of the profiles in the case of Primary and Middle levels of education. All these characteristics shown in ^{Chart} Chapter I are departure from the normal behaviour of age-education-earnings profiles, though the difference between Matric and above and primary and middle levels of education is quite clear.

Printing In the case of this category of workers the earnings differential between both the levels of education is quite obvious with line for Middle and above being higher than that for Primary and less, Though the line for Middle is smoother for this category than that for composing for the same level of education. The line for primary level shows a very steep rise between the age of 35-40 and a steep fall between the age of 40-45. The reason is one worker in this range getting the highest annual earnings.

CHART-

AGE-EDUCATION EARNINGS: PRINTING WORKERS



of ₦.11690. If we exclude this worker, the average for the age group 40-44 is only ₦.8050 which is less than half the average earnings for the age-group i.e. ₦.4778.

The age at which peak earnings are reached is 40 years for all the workers in this category. But in the case of middle and above education, there being no worker in the sample beyond the age group 40-44, after reaching the peak, the profile does not fall as in the case of primary and less. Still Chart 2 shows the differential in earnings between the two levels of education under study.

But on the whole, if with a bigger sample average earnings for each age group and level of education could be computed, the various crests and troughs shown in Charts 1 and 2 could be smoothened up.

Still, both these figures show a clear difference between the lines for various levels of education. This lead us to reject the Null Hypothesis No.1 stated in Chapter II that there is no earnings differential for extra education in the press industry.

CHAPTER VII

CONTRIBUTIONS OF EDUCATION, JOB-EXPERIENCE AND AGE ON ANNUAL EARNINGS

The aim of investigation in the present Chapter is to study the relationship between the annual earnings of two categories of press workers, their educational level, on-the-job-experience and age. The life time earnings and earnings differentials computed in the last Chapter give only about the association of earnings and education. The present treatment will enable us to study the relative contribution of the three predictors on the earning capacity of two categories of press workers.

The variables involved are:

Annual Earnings Levels = Y
Education = X_1
Job Experience = X_2
Age = X_3
Constant = X_0

Model : - / = Results

Regression Co-efficients and Multiple Correlation

Table 1

Category	1	2	3	$R_{Y.123}$
Composing	-1420 (79.2927)	+259.3** (30.02)	+62.88* (27.0227)	+.74**
Printing	+923.3 (59.2329)	+203.3* (32.5203)	+53.94 (30.6394)	+.54**

Note 1. Figures in brackets give errors of estimates.

Note 2. One star means significant at .05 level. Two stars mean significant at .05 and .01 level.

From the above table it can be inferred that the Null Hypothesis No.5 stated in Chapter II that there is no contribution^{of} education over earnings in press industry is rejected. On the other hand Null Hypothesis No.6 stating that there is no contribution of job-experience over earnings is rejected only at .05 level in the case of composing. It is accepted at .01 level both in the case of composing and printing categories of workers.

Null Hypothesis No.7 stating that there is no contribution of age over earnings is accepted in the case of both categories of workers of this press.

Null Hypothesis No.8 stating that the multiple correlation between the criterion variable and predictors is zero is also rejected as it is significant at .05 and .01 levels for both categories of workers.

Table 2.

Correlations between the annual earnings and three independent variables and their inter-correlations for both the categories
(Zero -order correlations)

S.No.	Variables	Co-efficient of correlation for composing.	Coefficient of Correlation for Printing.
0	1	2	3
1.	Earnings and Education	.2819*	.4665**
2.	Earnings and Job-Experience.	.6048**	.3513**
3.	Earnings and Age	.5363**	.2138
4.	Job Experience and Age	.8285**	.6904**
5.	Education and Age	-.1618	-.0203
6.	Education and Job-Experience	.0410	.1272

Note: One star means significant at .05 level. Two stars mean significant at .05 and .01 level.

As is clear from the above table, correlation between education and earnings is very low and significant only at .05 level. ^{in the case of composing,} This is very ridiculous as this occupation really requires higher level of education than that in printing as is clear from the data about education and earnings. On the contrary, the corresponding correlation for printing is higher and is significant at both the levels.

The correlation reflecting the relationship between education and earnings may be more reliable when the effect of other predictors i.e. age and job-experience is held constant. Consequently partial correlations of first and second order are computed and the results presented in Tables 3 and 4.

Table 3.

Partial Correlations of 1st Order

S.No.	Composing	Printing
0	1	2
1. $r_{y 1.2}$	= .3231	.4542
2. $r_{y 2.1}$	= .6189	.3328
3. $r_{y 3.1}$	= .6106	.2524
4. $r_{y 1.3}$	= .4355	.4921
5. $r_{y 2.3}$	= .3397	.2982
6. $r_{y 3.2}$	= -.0789	-.0425
7. $r_{y 31.2}$	= -.3320	-.1806
8. $r_{y 23.1}$	= .8462	.6988
9. $r_{y 12.3}$	= .0126	.5429

Table 4
Partial Correlations of 2nd Order

Sr. No.	Composing		Printing
	0	1	2
1.	$r_y 1.23$	$= .3715^{**}$	$.4534^{**}$
2.	$r_y 2.13$	$= .2422^*$	$.2259$
3.	$r_y 3.12$	$= .2086$	$.2949$

Note: One star means significant at .05 level and two stars mean significant at both .05 and .01 levels.

Partial correlations of second order for both the occupations are significant at both the .05 and .01 levels only in the case of education and earnings, while the effect of job-experience and age is held constant. This shows that education is the most important variable out of the three predictors, affecting earning capacity of workers in the press industry. Therefore it can be inferred from Table 4 that the Null Hypothesis No.2 stated in Chapter 2 that there is no correlation between education and earnings when the effect of job-experience and age is held constant is rejected. But the Null Hypothesis No.3 stating that there is no correlation between job-experience and earnings is rejected only at .05 level in the case of composing occupation, while it is accepted in the case of printing.

Null Hypothesis No.4 is accepted for both the categories of workers.

To know the relative contributions of education, job-experience and age on annual earnings these partial correlations are squared up. These are contributions of the three predictors respectively on earnings in the case of composing.

Education = 14%

Job-Experience = 5%

Age = 4%

But these three together explain only 23% of the earning capacity, while $R^2_y .123$ explains 55%.

This shows that in composing other variables e.g., socio-economic background ability, health, etc. are quite important.

In the case of Printing these contributions are as follows:

Education = 20%

Job-Experience = 5%

Age = .9% or 1%

By adding these three we get 25.9% while $R^2_y .123$ explains only 32% of the variation.

Here, the effect of these other variables is still more important.

In order to find out by how much the predictive value of the regression equation is reduced by dropping the variable X_1 , X_2 , X_3 etc. in turn, we find the following for both the occupations:

Table 5

Coefficients of Determination

Sr.No.	1	Re-Composing 2	Printing
1	$R^2_y .12$.4320	.3043
2.	$R^2_y .13$.4220	.1878
3.	$R^2_y .23$.2726	.0909

This shows that 43% of variance in earnings is related to variation in education and experience and 57% to variation in other factors in the case of composing.

In the case of printing these proportions are 30% and 70%. This strengthens our previous conclusion that in printing variables e.g., socio-economic background, ability mental attitudes, and health etc. are more important than in the case of composing. It must be out of place to point out that the interviewer had an impression during the interview that in Printing people are more fatalistic, tradition ridden, have less initiative and drive. They have uneducated parents and are from rural background. More over influence of caste affiliations and prejudices is quite strong over them. But the limitations of such a small study prevent us to generalise much on its conclusions. Still it is an indicator and as such it has brought out education as the most important variables under study influencing the earning capacity of press workers.

CHAPTER VIII
SUMMARY OF THE FINDINGS AND SUGGESTIONS
FOR FURTHER RESEARCH

The chief objective of the study was to find out the relationship between education and the earning capacity of the workers engaged in a modern industry. Consequently data was collected on annual earnings, age, formal education, experience, socio-economic background etc. from three year old workers of United India Press. Information on factors other than education was collected because it is unanimously recognised now that education is one of the many, though it is the most important factor affecting the earning capacity of people.

In the light of the works done by various economists in India as well as abroad, life-time-earnings and earnings differential were computed for Primary, Middle and Matriculation levels of formal education. The study shows that there are definite earnings differentials accruing to extra education.

Secondly, higher differentials for middle level education in the occupation of composing, show that middle level of education combined with job-experience seems to be more profitable for the press workers.

Here rates of returns might have given more accurate estimates of the profitability of these levels of education but it fell out-side the scope of the present study. If further research is to be conducted taking a more representative and bigger sample of the press workers, usual rate of return technique may be employed to study the profitability of the various levels of formal education as well as of on-the-job-training.

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In order to find out the relative contribution of education, job-experience and age, on annual earnings multiple regression analysis was made use of. The multiple correlation coefficients is significant for both the categories of press-workers, which shows that the combined effect of these three variables over earnings is very important.

On the whole, education has emerged as the most important variable as regression coefficients and partial correlations of the 2nd order are quite significant when the effect of job-experience and age is held constant.

But the effect of other variables e.g., socio-economic background attitudes and values, native ability and health etc. seems also to be very strong. The coefficients of determination for composing and printing are respectively 0.55 and 0.32.

It would thus appear very important to take up more empirical studies from different fields and find the profitability of various levels of education for people engaged in the different productive activities. Only on the basis of many such studies conducted in different parts of this vast country, rational policy decisions can be taken.

BIBLIOGRAPHY

Books

1. Anderson C.A. and Bowman M.J., Education and Economic Development (Aldine Publishing Company, Chicago, 1965).
2. Baljeet Singh, Education as Investment, (Meenakshi Prakashan, Delhi 1967).
3. Becker, G.S., Human Capital, (National Bureau of Applied Economic Research, New York 1964).
4. Blaug, M. and Others, The Causes of Educated Unemployment in India, (Mimeographed, 1968).
5. Bowman M.J., Debeauvais M., Komarev, V.E., Vaizey J., Readings in Economics of Education, (U.N.E.S.CO, France 1968).
6. Croxton F.H. and Cowden, D.J., Applied General Statistics, Prentice Hall of India, Ltd., (New Delhi, 1964).
7. Denison, E.F., Residual Factor and Economic Growth, (Organisation for Economic Cooperation and Development, Paris, 1964).
8. Goulden, C.H., Methods of Statistical Analysis, Asia Publishing House, (Bombay 1952).
9. Harbison F. and Myers C.A., Education, Manpower and Economic Growth, (McGraw Hill, Book Company, New York, 1964).
10. Harbison F. and Myers C.A., Manpower and Education, (McGraw Hill, Book Company, New York, 1964).
11. Marshall, A., The Principles of Economics (Macmillan and Co., London, 1961).
12. Philips H.M., Economic and Social Aspects of Educational Planning (United Nations Educational, Scientific and Cultural Organisation, Paris, 1964).
13. Bell Eric, History of Economic Thought (New York, Prentice Hall, 1957).
14. Schultz, T.W., The Economic Value of Education, (New York, Columbia University Press, 1963).
15. Sharma, R.C., A Benefit-Cost Analysis of Teacher's Education, (Columbia University, Unpublished Doctoral Dissertation, New York, 1967).

16. Taylor, O.H., A History of Economic Thought, (McGraw Hill Book Company, Inc., Tokyo.)
17. Vaisey J., The Economics of Education, (London, Faber and Faber, 1962).
18. Vaisey, J., and Robinson E.A.G. (Ed.), Economics of Education, (Macmillan and Co., New York, 1966).
19. Walker H.M. and Lev Joseph., Statistical Inference, (Oxford and I.B.N. Publishing Co., Calcutta, 1965).

20. Journals and Periodicals

1. Blaug M., "The Rate of Return on Investment in Education in Great Britain," The Manchester School, (September 1966).
2. Blaug M., "Literacy and Economic Development," School Review.
3. Blaug M., "Approaches to Educational Planning," Economic Journal, (LXXVII, 1967).
4. Houthekkar, H.B., "Education and Income," Review of Economics and Statistics, (February 1969).
5. Miller, H.P., "Life Time Incomes and Economic Growth," American Economic Review (September 1965).
6. Miller, H.P., "Annual and Life Time Income in Relation to Education," American Economic Review, (December 1960).
7. Morgan, J.N. and David M.H., "Education and Income," Quarterly Journal of Economics, (August 1963).
8. Halla Gauden A.M., "Investment in Education in India," Journal of Human Resources, (Summer 1967).
9. Schultz, T.W., "Investment in Man: An Economists View," Social Service Review, (June 1969).
10. Schultz, T.W., "Capital Formation by Education," Journal of Political Economy, (December 1960).
11. Schultz, T.W., "Investment in Human Capital," Journal of Political Economy, (October 1961).
12. Shaeffer, H., "Investment in Human Capital; Comments," American Economic Review, (December 1961).

13. Schultz T.W., "Reply to Shaeffer H., "Investment in Human Capital, Comment," American Economic Review, (December 1961).
14. Kikker, B.F., "Historical Roots of the Concept of Human Capital," Journal of Political Economy, (October 1966).

Reports of Various Agencies

1. Report on the Committee of Workers Education, National Commission of Labour, November 1967.
2. Report on Literacy Among Industrial Workers, Committee on Plan Projects, Government of India, New Delhi, 1964.
3. Working papers in connection with Draft Fourth Five Year Plan, Perspective Planning Division, Planning Commission of India, (1965-68).
4. Working Paper for the Seminar on the Planning of Adult Literacy in Asia (Simla, 1966) Prepared by the Asian Institute of Educational Planning and Administration.
5. Pandit, H.M., "A Study in Unit Cost at School Stage in India," (Jaipur, 1967), National Council of Educational Research and Training.

Mimeographed Literature

1. Mehta, M.M., "Measurement of the contribution of Human resources to Economic Growth," (Mimeographed), Asian Institute of Educational Planning and Administration.
2. Myint Hia, "Education and Economic Development," Asian Institute of Educational Planning and Administration.
3. Bhatawdekar M.V., "Approaches to Educational Planning," Asian Institute for Economic Development and Planning, (Mimeographed, 1967).
4. Hussain I.E., "Returns approach to Educational Planning," Lucknow University, (Mimeographed).

APPENDIX - I

INTEREST OF ECONOMISTS IN EDUCATION AND TRAINING - A HISTORICAL BACKGROUND

Interest of the modern economists in the field of investment in education is on account of the following factors:

(i) Education is no longer considered only a social infra-structure but also one of the important variables contributing to the productivity of human resources.*

(ii) It is also considered as potent factor for equalising socio-economic imbalances.

(iii) All state governments in the developing regions have taken the responsibilities for bringing about radical socio-economic transformations of their states for which education is considered one of the major factors. Therefore, education is no longer the concern of student community and that of the parents only. Hence, the responsibility for education (brain power) industry has shifted from the individual to the state.

C.S. Benson** has clearly divided the interest of modern economists in the field into four major areas. These are:

(1) measurement of economic benefits and costs;

*For fuller details, please see, P.A. Harbison and C.A. Myers, Education, Manpower and Economic Growth, 1963.

**C.S. Benson "Economics and Education," in Review of Educational Research, Vol. XXXVIII, No.1, February, 1967, Chapter VIII, p.96.

- (ii) educational planning;
- (iii) efficiency considerations; and
- (iv) adequacy of sources of revenue for education.

But we are mainly concerned in this project to study the relationship between education and earnings of the industrial workers only. As this topic broadly falls in the first area listed by Benson, therefore a review of literature on this aspect of the problem is presented here. As this review will reveal, two broad approaches have been adopted to study the relationship between education and earnings of workers. These are:

- (i) cost of production of human skills;
- (ii) capitalised earnings of workers*.

This review is divided into three parts.

- (1) mercantilists;
- (ii) classical economists; and
- (iii) modern economists.

Early civilizations were marked by a rigid dichotomy between the "nobility" and the "working force." Education was in that scheme of things a preserve of the former classes, while those who engaged in productive work were deemed to a life of complete ignorance and servitude. Later, in the mediæval period education essentially remained tied to the apron strings of theocracy- more for preparation for a later life in heaven than as a means of bettering the lot of the

of the people in their existing span of life.

Mercantilists

But a welcome change came during the period of "Merchantalism" when various statesmen and policy makers realised that 'Art' was a separate and a distinct factor of production. They reached the conclusion that not merely a 'scholar' or 'arbiter' of the working class, but only the higher 'skills' and efficient labour of the people could conserve the 'natural wealth' by exporting the "artificial wealth" of a nation*.

It will be of interest that as early as 1691, William Petty tried to evaluate human capital of Great Britain. He found that human and physical capital are in the ratio 5:3**.

E.A.J. Johnson*** further says "Petty must none the less be regarded as a pioneer in the use of quantitative methodology," as far as economic problems are concerned.

Nehemia Grew also pleaded for "Planned Utilisation of all the members of a nation's work force, carefully and properly trained for their respective occupations and tasks"**** other names associated with this approach towards education of the workers contributing to their productivity and hence earning capacity of the working force, in the seventeenth century are that of Edward Misselden and Thomas Mun.*****

*See Johnson E.A.J., "The Place of Learning Science Vocational Training and Art in Pre-Smithian Economic Thought," Readings in Economics of Education, U.N.E.S.C.O., 1967, Pp.25-32.

** Ibid, P.27-28.

***Ibid, p.28

**** Ibid, p.29

***** Ibid,

This trend is carried on in the eighteenth century. Poptethwayh in mid eighteenth century recommended for a national effort to ensure economic progress ^{thru} ~~then~~ not only educating the merchants and the farmers but also providing industrial training to the artisans. He proposed that Royal Society be made responsible to supervise this training of commercial and industrial arts and also pleads for getting expert personnel from outside the country to train people.

The essence of this period of economic thought is that 'art' is just another factor of production. Among many other benefits accruing to the economy because of 'Art,' "The use of 'artful' methods in agriculture or manufacture would reduce unit cost of production, make goods ~~were~~ ^{more} abundant and raise incomes".

David Huve^m was also of the opinion that enlightenment of the mind and higher productivity which are both consequence of better education go hand in hand with each other. This process is summed up by Johnson in the following words: "Out of the greater productivity which industrial arts make possible comes an increasing range of occupations higher incomes, "New Desires," broader horizons, and rising expectations".

But David Huve was also a precursor of the trend of ^{this} usually associated with the classical economists.

* Ibid, p.32

**Ibid, p.32

Classical Economists

Late eighteenth century and nineteenth century usually associated with the economists of classical school with their emphasis on Laissez faire and removal of all mercantilist tariffs and other restrictions, is marked by two parallel trends as far as relationship between education and earnings is concerned; one of which was more concerned with quantitative measurement of life time earnings, while the other looked upon education more for restoring human dignity.* The essence of their educational philosophy being "Rationalism of Freedom".

Let us first discuss the contributions of economists who systematically developed the methodology introduced by Sir William Petty in economic analysis for evaluating human capital.

By about 1853, William Farr** studying the individual life time earnings of human beings by taking total future earnings less by the personal living cost. On this basis, he pleaded for a tax on human beings on their net earnings. The absurdity of this suggestion later involved a voice of protest by Alfred Marshall and J.S. Mill.

By 1883, Ernst Engel*** adopted a cost of production procedure to calculate the monetary value of a human being.

*See forward to Section I Readings in Economics of Education, UNESCO, 1968 (pp.15-16).

**B.F. Kinkor, "The Historical Roots of the Concept of Human Capital" The Journal of Political Economy, Vol.LXXIV, Oct. 1966.

***Ibid,

He stated that an individual was fully produced when he is twenty six years old. He takes up some empirical studies and comes to the conclusion that in Germany the cost incurred up to birth of a man was as follows:

100 marks for the lower social classes.

200 " " " middle " "

300 " " " upper " "

His approach is significant as later economists worked on similar lines to estimate the cost of the components of human capital such as education health, on the job-training etc.

Theodore Wittstein^{**} 1867, combined the above two approaches given by William Furr based on capitalised earnings and by Ernst Engel on cost of production.

His assumption was that life time earnings are equal to life time maintenance cost plus education. He comes to the same result by both approaches, that is the life time earnings and life time maintenance are both equal to zero at birth.

^{rk} Kiper criticises the conclusion of Wittstein about this

*Ibid, p.483. Ingels gives a formula for calculating cost of an individual at age x.

$$C_x = C_0 \left\{ 1 + k \left[x \frac{(x+1)}{2} \right] \right\}$$

Where C_x is the total cost of producing an individual up to age x where $x \leq 26$ years.

C_0 is the cost up to birth, k = is the annual percentage increase in cost.

** Ibid, p.484.

equality and also his combination of two methods which may result in "duplication of values". It is, however, to be noted that these attempts were made not by professional economists but by professional people.

Dublin and Lotka** made a similar though more sophisticated attempt than Wittstein. Their interest was also in estimating the limit of loss to the family of an individual in case of his untimely death. This they wanted to use as the limit of life insurance for that person. They conclude that the economic value of a man to his family equals his income less his maintenance. Dublin also calculated that human capital value in U.S.A. in 1922 was five times the material wealth***.

S. Mushbin and Weisbrod**** are of the opinion that maintenance costs should not be subtracted from the earnings to arrive at the value of human capital. The reason advanced by them to do so is that maintenance may reduce "annual depreciation" considerably by prolonging the human life and improving the quality of skills and capacities. Thus maintenance costs are a form of investment in human capital. ^{Hence} Thus Petty's avoidance of maintenance costs while evaluating human capital is more in conformity with the modern works in this field than ^h those of William Furr and Engel who wrote almost two century later than him. The work of Dublin and Lotka is to be criticised more on that account.

*Ibid, p.484.

**Dublin L.I. and Lotka. A., Quoted in Ibid, Pp.484-485.

d ***Ibid, 484.

****Ibid, see foot note 3, p.482.

Coming to the works of early classical economists, we find the role of education more emphasised for civic and humanitarian purposes than as a means of creation of wealth.

The new machines and the consequent division of labour reduced the role of human efforts to just some simplified movements requiring no ingenuity and initiative. On the other hand the capitalist relations in production led to the problem of alienation of labour from firstly the commodities produced and secondly from means of production. Thus the labourer lost all the dignity of labour and sense of creation he had earlier when there was only simple division of labour involved. The relation between the produce of labour and his earning capacity was also lost.

Adam Smith and Karl Marx touched this problem from different points of view.

Adam Smith* laid bare the disadvantages of division of labour which result in making a man imbecile and mentally deficient. In his words it also "alienates the worker from society". But Smith is content to suggest a public system of education for providing a solution to this problem within the capitalistic system. Marxian remedy is of course destruction of the capitalist system itself because of inherent contradictions in it. He says only socialism can put an end to this problem of alienation by a system of workers education and by removing

*J. Vaizey, "The Economics of Education," London Faber & Faber, 1962,

private property in the means of production*. In such a society the earning capacities of the workers because of education will increase manifold. This conclusion, however, has been proved valid by studies of V.E. Komarev and S.G. Stetsilia in U.S.S.R. taken up in twentieth century.

However, in the works of Malthus and Ricardo, we find the consumption aspect of education stressed more than its investment aspect Malthus** found in Education a means of controlling population explosion. It is with this end in view that he simultaneously advocated generous public support for education and repeal of Poor Laws of England.

Even Nassau Senior***, though having no illusions about considering human beings as above capital, was more concerned with education teaching the value of abstinence for facilitating capital accumulation than contributing to workers earning capacity.

It is interesting to note the famous debate in economics thought upon whether or not to include human beings into the category of capital****.

*See text of a speech delivered by Justice Colonel Gadhkar on Birth Anniversary celebrations of Marx in Sanshodh on day 10, 1968.

** Eric Roll, History of Economic Thought, New York, Prentice Hall, 1967.

*** Ibid.

****See S.F. Kibber's "The Historical Roots of the Concept of Human Capital" The Journal of Political Economy, Vol. LXXIV, Oct., 1966.

Marshall's* views upon this problem can be well judged from the following:

"We are seeking a definition that will keep realistic economics in touch with the market place" on this Schultz accused him to be victim of the old feudal "Lord and Vassal" relations. Moreover he says that if on sentimental basis people like Marshall want to exclude human beings from the category of capital its very inclusion in the same is truer on sentimental grounds**. The validity of this remark is cleared when we study the reasons given by J.H. Von Thunen, Irving and Leon Fisher, etc.***

Van Thunen, says "We can see how superficial is this politeness and elevation of status; the industrialist looks upon the workers and machines from the view point of costs."

While dwelling on the hypocrisy of this notion during war he says "One will sacrifice in battle a hundred human beings in the prime of their lives without thought, in order to save one gun."*****

*Marshall A., Principles of Economics, London, Macmillan & Co. 1961, App. E, p.650.

**Schultz T.W., "Investment in Man, an Economists View." The School Service Review, Vol.33, No.2, June 1959.

***B.F. Kibber "The Historical Roots of Concept of Human Capital" Journal of Political Economy, Vol.LXXIV, Oct. 1966, Pp.486-488.

****H. Von Thunen "Costs of Education as Formation of Productive Capital" Readings in Economics of Education, UNESCO, 1968, p.394.

*****Ibid, Pp.391-392.

Von Thunen* elaborated more on the problem of education versus earnings of workers. When he gave a ratio between the wages of people with two different levels of education. He assumes their respective costs of education as 'm' and 't'. If 'A' were the wages of the man whose cost of education is 'm', the wages of the man having 't' as his cost of education will be $(\frac{t}{m})^r$ times A. Thus the resultant ratio is $A : (\frac{t}{m})^r A$. The quantity $(\frac{t}{m})^r$ is based on his assumption that costs of education are related as rth power of $\frac{t}{m}$.

But his refusal to consider man as capital should not lead us to minimise the great contribution of Marshall in restoring the importance of investment aspect of education, simultaneously recognising its consumption value. He says, "It raises the tone of his life in working hours and out of working hours; it is thus an important means towards production of material wealth; at the same time regarded as an end in itself, it is inferior to the none**"

His views on the role of education in increasing average wage rate can be summed up as follows:

1. "Mechanical progress" is responsible for earnings differential between the skilled and the unskilled.
2. It also results in tremendous increase in 'national dividend'.

*Ibid, p.392.

**Marshall, A., Principles of Economics, Macmillan & Co., London, 1961, p.176.

3. In the absence of this rise in national dividend wages of the unskilled workers will be lower than now.

4. Education can raise the quality of the children of the unskilled and this reduce the proportion of the unskilled in the future total labour supply.

5. This will result in still further rise in national dividend and hence average wage rate will also rise.

In his mathematical appendix i.e. He emphasises public education because of discovery of talent which is not absent in the lower classes.

He even discussed how to calculate the returns on education.

Marshall's influence is acknowledged by the Russian academicians and economic thinkers upon their theoretical concepts about the role of education in increasing a labour productivity and hence in augmenting the earning capacities of the workers*.

A study by Kahan^{**} on Russia reveal that awareness of the role of formal education in stepping up the efficiency of industrial workers, dated as far back as eighteenth century. Some empirical studies were taken up in nineteenth century and early twentieth century for finding out earnings differentials between illiterates and literates in industry***.

*See Kahan's discussion on "Economic Evaluation of Popular Education" in "Some Russian Economists on Returns to Schooling and Experience", etc. (Pp.400-401), Readings in Economics of Education, W.N.E.S.C.O., 1968

**A. Kahan, "Some Russian Economists on Returns to Schooling and Experience" Readings in Economics of Education, UNESCO, 1968.

***Ibid, Pp.401-402.

S.G. Strumilin* and E. Liustikh attempted to derive the relative contributions of education, job-experience and age. They employed multivariate analysis and came to the conclusion that education is "the major factor determining the wage differentials."

S.G. Strumilin's** findings is that a year of formal schooling in U.S.S.R. raises the productive potential of a worker 2.6 times more than a year of on-the-job-training. His purpose being advocacy for higher investments in education, he showed that social benefits of elementary education were exorbitantly high. This is clear from the following:

Average working life of a soviet worker = 37 years.

Working time sufficient to cover cost of education = 1.5 Yrs.

Hence social benefit (net annual income) = 35.5 Yrs.

The spectacular economic development of Japan***, a late entrant in the field, in face of scarce natural resources and low level of capital accumulation is a unique example. It is

*Ibid, p.403, See also foot notes 14-17 on p.405, where regression models worked out by both of these Russian writers are given. Liustikh's regression equation is the following: $X = 327.4 + 4.81S + .37t$ where X = Wage, S = years of education, S = job-experience and t = age.

**S.G. Strumilin "The Economics of Education in the U.S.S.R." Economic and Social Aspects of Educational Planning, U.N.E.S.C.O.

***Koichi Kishi, "Economic development and educational system in the Meiji Era," Readings in Economics of Education, UNESCO, 1962.

new unanimously being recognised a growth rate of five per cent in inspite of such heavy odds, is in fact mainly the social rate of return to huge investments made on education during Meisi Era. The beginning for this had already being made in late Tokugawa period. Even the realisation of association of education and upward social mobility was there in Tokugawa period. Thus Japan was able to evolve a truely "national system of education," imbibing much that is good in the west but keeping in tact the essential national character of its education*.

*Herbert Passin "Potents of Modernity and the Meizi Emergence," Education and Economic Development, edited by C. Arnold Anderson and Mary Lean Fowman, Chicago, 1963.

APPENDIX-II

(Confidential)

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A Study of Education & Earnings of Workers

1. Identification

Name and Address:

Sex

Age

II. Socio-Economic Position

1.	2	3	4
<u>Relation</u>	<u>Occupation</u>	<u>Education</u>	<u>Earnings</u>

III. Education

<u>Examination</u>	<u>Year</u>	<u>Class</u>	<u>Board or University</u>
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1. Primary

2. Middle

3. Higher Secondary

4. Above.

IV. On-the-job Training

1	2	3	4
Organisation	Duration	Nature of Training	Has it helped promotion?

V. Present Employment

<u>1</u> Job	<u>2</u> Period	<u>3</u> Grade	<u>4</u> Nature of Pay Job	<u>5</u> <u>Emoluments</u> Allow- ances	Bonus	Total
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VI. Previous Experience

<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Organisation	Job	Period	Grade (Last Payment)	Nature of Job

VII. Work Load

1	2	3
Last Week	Present Week	Total leave during that year
From to	From to	

VIII. Job Satisfaction

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